

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

15 March 2001 (15.03.01)

International application No.

PCT/HU00/00076

Applicant's or agent's file reference

9939/K

International filing date (day/month/year)

07 July 2000 (07.07.00)

Priority date (day/month/year)

07 July 1999 (07.07.99)

Applicant

FEKETE, János

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

27 January 2001 (27.01.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number
WO 01/03635 A1

(51) International Patent Classification⁷: A61H 3/06,
A61F 9/08, G09B 21/00, G06K 9/00

(21) International Application Number: PCT/HU00/00076

(22) International Filing Date: 7 July 2000 (07.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
P 9902295 7 July 1999 (07.07.1999) HU

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(81) Designated States (national): AE, AL, AM, AT, AU, AZ,
BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,

DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, ID, IL, IN,
IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO,
RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG,
US, UZ, VN, YU, ZA, ZW.

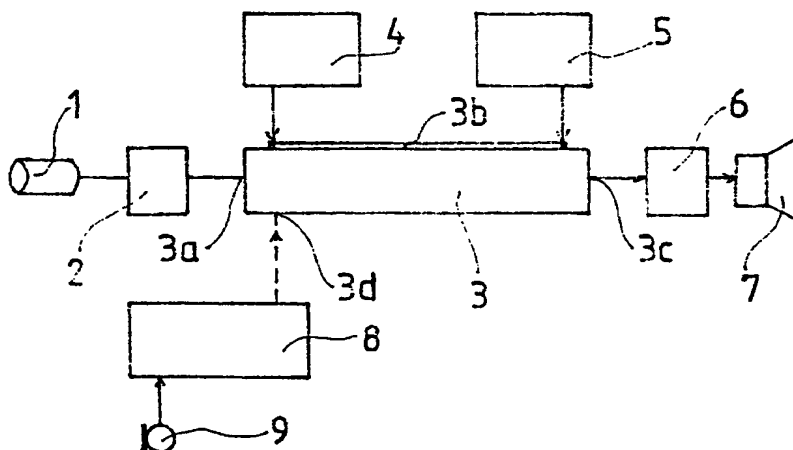
(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- With international search report.
- Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DEVICE FOR AIDING THE ORIENTATION OF THE BLIND



(57) Abstract: The invention relates to a device to aid the orientation of the blind, which contains a sensing unit fixed to the body surface of the person using it and processing unit connected to the sensing unit. The characteristic feature of the solution is that the sensing unit has a CCD camera (1) and the processing unit has a microprocessor (3), the microprocessor (3) has an analogue input (3a), external bus (3b) and output (3c), through the signal forming unit (2) of the camera (1) it is connected to the analogue input (3a) of the microprocessor (3), picture memory (4) and sound memory (5) is connected to the external bus (3b) of the microprocessor (3), and with the implementation of an amplifier (6) a loudspeaker (7) suitable for transmitting speech information is connected to the output (3c) of the microprocessor (3).

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Device for aiding the orientation of the blind

The invention relates to a device that aids the orientation of the blind, which contains a sensing unit that can be fixed to the body surface of the person using it and a processing unit that is connected to the sensing unit.

There are many types of device today that aid the blind to move about, of these there is the stick, the disadvantage of which is that the sensing distance is small. A significant aiding partner is a trained guide dog, the acquisition and keeping of which is very expensive. The general deficiencies of the known aiding devices are that they do not give information regarding the pictures and the direction of the obstacles, only of their presence.

The software that is available commercially is capable of producing a relationship between pictures and sounds, but it requires a great deal of hardware, so because of its dimensions and high price it will not become a mass produced article. Due to the development of microchips development engineers are provided with microprocessors with a high operating speed and a large memory capacity in a sufficiently small size, cheaply, and they can be programmed as required, so they may become mass produced articles, like for example, the hearing aid.

With the invention our aim was to overcome the deficiencies of the known aiding devices and to create a device that supports the picture creating ability of the blind and so improves their sureness of movement and aids better and more precise orientation.

Our aim was for the device to be small and its production cost and selling price allow it to be sold as a mass produced article.

The basis of the idea of the invention was formed by the recognition that if with the help of an optical device fixed to the head capable of producing pictures of objects, comparing these with the pictures of groups stored earlier in a database with the help of a computing device we select a sound identifier that the most closely relates to the object and this is played to the blind person in an audible form, then carrying out the simple picture-sound transformation the task may become solvable.

In accordance with the set aim the device according to the invention to aid the orientation of the blind – which contains a sensing unit fixed to the body surface of the person using it and processing unit connected to the sensing unit – is formed in such a way that the sensing unit has a CCD camera and the processing unit has a microprocessor, the microprocessor has an analogue input, external bus and output, through the signal forming unit of the camera it is connected to the analogue input of the microprocessor, picture memory and sound memory is connected to the external bus of the microprocessor, and with the implementation of an amplifier a loudspeaker suitable for transmitting speech information is connected to the output of the microprocessor.

A further criterion of the device according to the invention is that the microprocessor has a data transfer input, and through a recording unit temporarily connected to the data transfer input a microphone is connected serving to read in verbal information.

In a possible version of the device the microprocessor has a controller part unit suitable for reading in and processing picture and sound information at the same time, the controller part unit is connected to the internal memory unit serving as a store for the picture information and a second internal memory unit serving as a store for the sound information, the two internal memory units are connected to an identifying unit serving the searching according to picture information and also serving to connect up the picture and sound information.

The device has numerous advantageous features. An important advantage is that in the brain of a person blinded in an accident there is a kind of „picture” of the environment and the world, so it is easier to give back the concrete pictures of the objects in their area of movement, of his/her home and neighbourhood by naming them.

Those born blind participate in different training processes, where with the help of touch, feel and explanation they carry the visible pictures of only a few objects and situations, so for them the advantage of the device is that making use of its free programming ability so-called global pictures can be produced in accordance with the person's „vocabulary”.

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A favourable point is that due to the transformation of new picture information to sound information recognising, identifying obstacles occurring while moving about as pictures, then playing them as sound, the device guarantees a much better feeling of security than the already realised bleeper, signalling devices.

Another advantage is that on the one hand that the picture and word vocabulary of the device is programmed in a fixed way during manufacture, and on the other hand that a seeing person in the environment of the person using the device can carry out customised programming, so the device can become language independent and be simply used anywhere in the world.

Another favourable feature is that the information stored in the device does not use the „usual: bmp, jpg, ...” picture storage procedures, but its unique resolution is low (64x8 bit is one picture), so due to the small amount of space required the upper limit of the number of pictures that can be stored is only a question of memory capacity, it is possible to produce cheaper, more modest one hundred word devices, or more expensive devices containing even one thousand picture word connections.

Due to the low resolution an advantage is that many different objects, but similar in profile are forced into one group, but the aim is not to recognise a type, or the brand of a motor vehicle, differentiating is satisfactory.

Another advantage that has to be mentioned is that the weight of the device is low, as its consumption, its price is modest, affordable by all, its covering is protected against rain, its sensitivity even in dusk is satisfactory, as it ensures stable operation even in environmental light of 0.2 lux.

It is also important to emphasise the advantageous feature that technically a resolution may be attained with which letters, characters may be „read out”, and with this a new area of use opens, not only for the blind, but also for those with poor sight.

It is practical for the device to be fitted to the arms of a spectacles frame (also ensuring its aesthetic production), in accordance with the head movement-seeing psychological effect it is turned in the direction of „viewing” and so the optical sensor of the device fixed in this way sees a real, black and white picture. A microcomputer transforms the produced signal series with AD conversion, stores it, then compares it with the bit pictures of signal forms belonging to an average of one hundred pictures recorded during programming. In accordance with the result of the comparison an expression is selected that was associated with the picture during programming and the name of the picture is read out through miniature loudspeakers.

In connection with the example the invention is presented in more detail on the basis of drawings. On the drawing

Figure 1 is the outline sketch of a version of the device,

Figure 2 is a picture showing the video signal mapping,

Figure 3 is the block diagram of the steps of the operating program.

Figure 1 shows the outline of the important elements of the device. The CCD camera 1 provides the basic signal of the device, which the joining module 2 edits and adjusts in amplitude for the microprocessor 3.

The sample-taking subroutine of the processing program stores the video signal coming into the analogue input 3a of the microprocessor 3 in 64 pieces, 8 bit words – as shown in figure 2 – as one block in the working register. This low resolution gives the device the advantage that it sees quite a lot of similar objects to be the same. The procedure can continue here in two directions.

In the case that we are in the „learning” status, in other words we connect the writing unit 8 temporarily to the data transfer input 3d of the microprocessor 3 then it writes the contents of a given block into the picture memory 4, provides it with a serial number, which it then uses as an index during the search process. At the same time it stores the short describing expression arriving through the microphone 9 into the sound memory 5.

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If we are in the recognition or user status, the program – the block outline of which is shown by figure 3 – takes the blocks from the picture memory 4 in line, compares them with the blocks to be found in the working register, then in the case of sameness on the basis of the index belonging to the given block the expression belonging to the index is selected from the sound memory 5, transferred to the output register, then „sent” out through the output to the amplifier 6, then to the loudspeaker 7. The process is repeated like this, then if there is no identifiable block a message „unknown obstacle” is heard.

In the interest of reliable identification the picture needs to be a standing picture for one second!

Deriving from the video signal frequency and the type of microprocessor and its clock pulse (100 MHz) approx. ten measurement take place in one second, this is enough of a guarantee for reliable recognition. This value is close to the human recognising ability, e.g. the running into one another of pictures while you shake your head.

List of references

1 camera
2 joining module
3 microprocessor

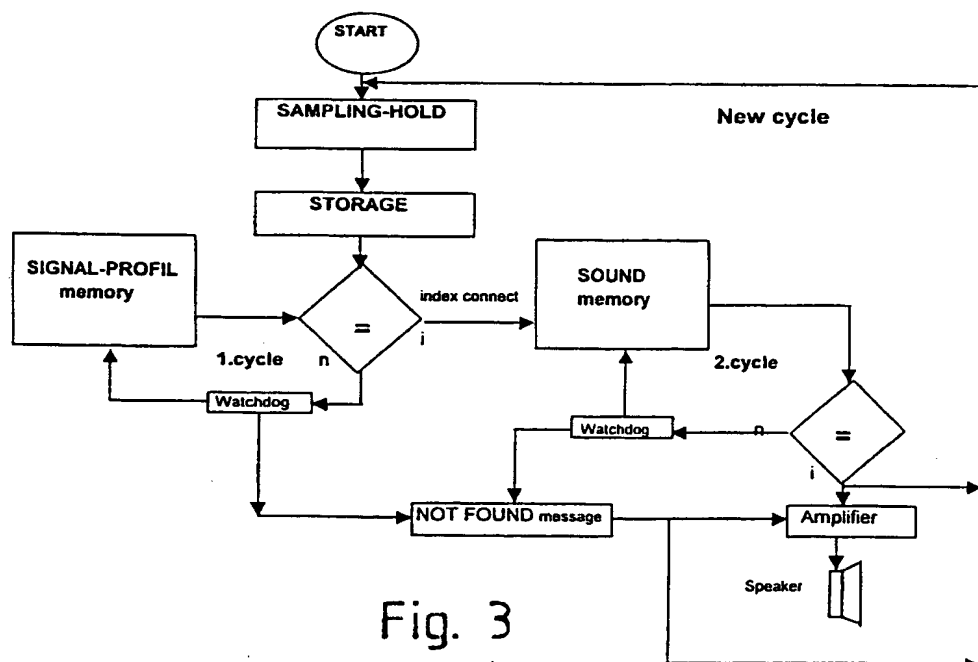
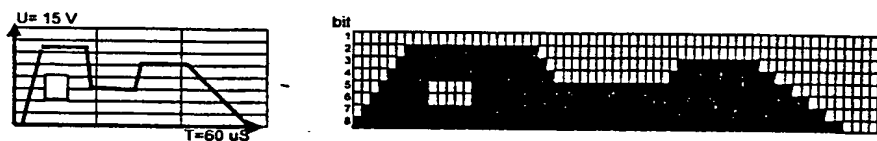
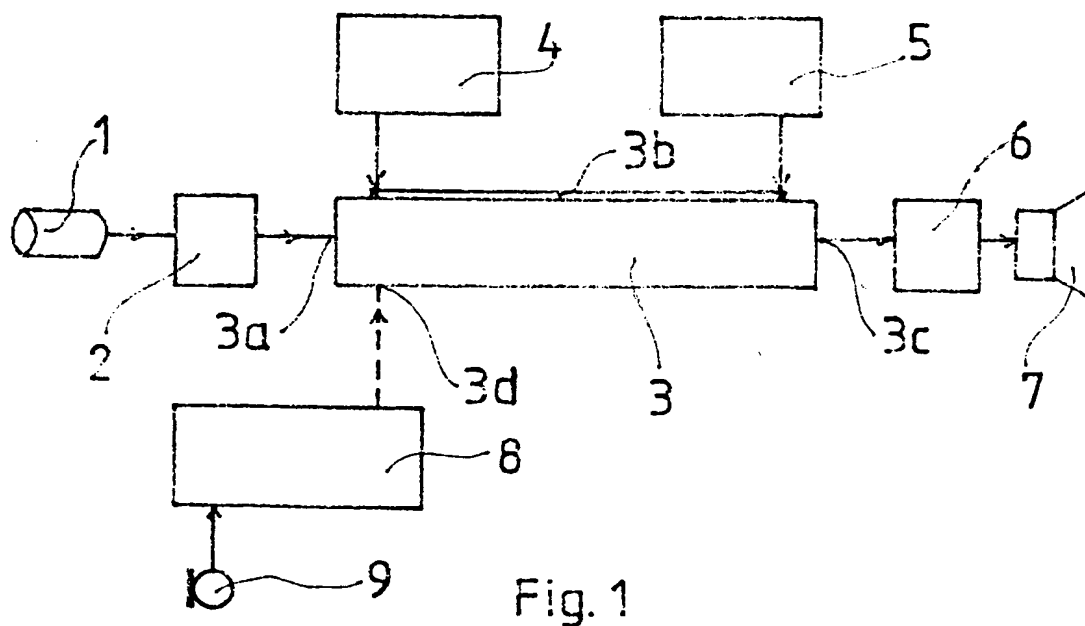
4 picture memory
5 sound memory
6 amplifier
7 loudspeaker
8 writing unit
9 microphone

3a analogue input
3b external bus
3c output
3d data transfer input

Claims

1. A device to aid the orientation of the blind, which contains a sensing unit fixed to the body surface of the person using it and processing unit connected to the sensing unit, characterised by that that the sensing unit has a CCD camera (1) and the processing unit has a microprocessor (3), the microprocessor (3) has an analogue input (3a), external bus (3b) and output (3c), through the signal forming unit (2) of the camera (1) it is connected to the analogue input (3a) of the microprocessor (3), picture memory (4) and sound memory (5) is connected to the external bus (3b) of the microprocessor (3), and with the implementation of an amplifier (6) a loudspeaker (7) suitable for transmitting speech information is connected to the output (3c) of the microprocessor (3).
2. Device according to claim 1 characterised by that the microprocessor (3) has a data transfer input (3d), and through a recording unit (8) temporarily connected to the data transfer input (3d) a microphone (9) is connected serving to read in verbal information.
3. Device according to claims 1 or 2 characterised by that the microprocessor (3) has a controller part unit suitable for reading in and processing picture and sound information at the same time, the controller part unit is connected to the internal memory unit serving as a store for the picture information and a second internal memory unit serving as a store for the sound information, the two internal memory units are connected to an identifying unit serving the searching according to picture information and also serving to connect up the picture and sound information.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/HU 00/00076

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61H3/06 A61F9/08 G09B21/00 G06K9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61H G09B A61F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KAWADE M: "IMAGE UNDERSTANDING FOR NAVIGATION SUPPORT SYSTEM" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FUZZY SYSTEMS, US, NEW YORK, IEEE, 20 March 1995 (1995-03-20), pages 29-30, XP000699268 ISBN: 0-7803-2462-5 the whole document	1
A		3
A	EP 0 235 460 A (AL BASRI AKEEL) 9 September 1987 (1987-09-09) page 1, line 1 -page 2, line 12 -/--	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

23 November 2000

Date of mailing of the international search report

30/11/2000

Name and mailing address of the ISA

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Authorized officer

Millward, R

INTERNATIONAL SEARCH REPORT

International Application No

PCT/HU 00/00076

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 40 04 438 A (LASCHUETZA MANFRED ;STUETZER HELMUT (DE)) 22 August 1991 (1991-08-22) column 2, line 27 - line 49 column 3, line 53 -column 4, line 12 ---	1
A	US 5 097 856 A (CHI-SHENG HSIEH) 24 March 1992 (1992-03-24) column 2, line 31 -column 3, line 13 ---	1
A	DE 297 07 020 U (FOERSTER KATRIN ;KOLA DANIELA (DE); SCHNITZER MAIK (DE)) 25 September 1997 (1997-09-25) page 2, line 18 - line 29 page 3, last paragraph -page 5, line 2 -----	2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/HU 00/00076

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0235460	A	09-09-1987	NONE	
DE 4004438	A	22-08-1991	NONE	
US 5097856	A	24-03-1992	NONE	
DE 29707020	U	25-09-1997	DE 19711080 C	05-11-1998

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 9939/K	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/HU 00/ 00076	International filing date (day/month/year) 07/07/2000	(Earliest) Priority Date (day/month/year) 07/07/1999
Applicant FEKETE, János		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

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Minimum documentation searched (classification system followed by classification symbols)

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- * & * document member of the same patent family

Date of the actual completion of the international search

23 November 2000

Date of mailing of the international search report

30/11/2000

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/HU 00/00076

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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DE 29707020	U	25-09-1997	DE 19711080 C	05-11-1998